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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,725	08/25/2003	Jongyoon Han	1153.034US2	4705

35437 7590 01/17/2007  
MINTZ LEVIN COHN FERRIS GLOVSKY & POPEO  
666 THIRD AVENUE  
NEW YORK, NY 10017

EXAMINER
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WATTS, ALLISON LEIGH

ART UNIT	PAPER NUMBER
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1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/17/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

**Application No.**

10/648,725

**Applicant(s)**

HAN ET AL.

**Examiner**

Allison L. Watts

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 24-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-56 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 8/25/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

2. A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 24-41 and 44-56 are rejected under 35 U.S.C. 102(e) as being anticipated by Austin et al.

4. As to Claims 24, 30, 32, and 38, Austin et al. disclose a device for separating molecules including constricted regions (54, between 73 and 74) (Figures 4A, 7) and unconstricted regions (above 76) that form a channel (206) (Figure 16), where the unconstricted regions are sufficiently large for a larger molecule to attain its equilibrium shape as it moves through the channel (Figures 17A-17E, Column 21, lines 22-30) in response to a driving force (Column 6, lines 7-11) and the constricted regions are sufficiently small to influence the shape of the molecules moving through the channel (Column 21, lines 12-30).

5. As to Claims 25 and 33, Austin et al. disclose the constricted provide a trapping point adjacent an unconstricted region, wherein the larger molecules have a wider contact area and therefore a higher probability of escaping the unconstricted region (above 76) through a constricted region than a smaller molecule (Figure 7, Column 14, lines 15-34).

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6. As to Claims 26 and 34, Austin et al. disclose the molecules in the unconstricted regions in a relaxed state and are hindered from entering adjacent constricted regions (Figure 7, Column 14, lines 15-34).

7. As to Claims 27 and 35, Austin et al. disclose a substrate providing support for the channel (Column 5, lines 19-25).

8. As to Claims 28 and 36, Austin et al. disclose the constricted regions are nanofluidic (Column 10, lines 59-62) and the unconstricted regions (above 76) are obstacle free (Figure 7).

9. As to Claims 29 and 37, Austin et al. disclose the equilibrium shape of a smaller molecule having a radius of gyration and the constricted region having a dimension less than the radius of gyration (Column 10, lines 59-62, Column 11, lines 5-9).

10. As to Claim 31, Austin et al. disclose that the equilibrium shape of larger molecules is influenced by the constricted region to a greater extent (Figure 16, Column 21, lines 16-18) than the equilibrium shape of a smaller molecule (Figure 7, Column 14, lines 26-30,

11. As to Claim 39, Austin et al. disclose a device for separating molecules comprising an input reservoir (32) and output reservoir (34) (Figure 6, Column 5, lines 19-29) alternating constricted and unconstricted regions that form a channel between them (206) (Figure 16), with the unconstricted regions having a depth and length sufficient to allow a larger molecule to approach equilibrium as it moves through the channel (Figures 17A-17E, Column 21, lines 22-30) in response to a driving force

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(Column 6, lines 7-11), and with the constricted regions having a depth less than an equilibrium shape of a smaller molecule (Column 10, lines 59-62).

12. As to Claim 40, Austin et al. disclose the reservoirs containing a buffer solution (Column 13, lines 23-31).

13. As to Claim 41, Austin et al. disclose a contact within the input reservoir (32) and a contact within the output reservoir (34) to contact the buffer solution (Figure 6, Column 13, lines 33-36).

14. As to Claim 44, Austin et al. disclose a separating device comprising a loading chamber (66), a plurality of channels (206) coupled to the loading chamber with alternating constricted (54, between 73 and 74) and unconstricted regions (above 76) (Figures 4A, 6, 7, 16, Column 13, lines 23-41), the unconstricted regions having a depth and length sufficient to allow a larger molecule to approach equilibrium shape as it moves through the channel (Figures 17A-17E, Column 21, lines 22-30) in response to a driving force (Column 6, lines 7-11), and the constricted regions having a depth less than an equilibrium shape of a smaller molecule (Column 10, lines 59-62).

15. As to Claim 45, Austin et al. disclose the separation channels having different structural parameters including a transverse dimension and length of the regions (Column 10, lines 59-62).

16. As to Claim 46, Austin et al. disclose the parameters optimized for separation of different length ranges of molecules (Column 14, lines 26-34).

17. As to Claim 47, Austin et al. disclose the loading chamber comprising of multiple support pillars (Column 5, lines 22-25 and 56-62).

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18. As to Claim 48, Austin et al. disclose the loading chamber (66) (Figure 6) coupled to a loading channel (137, 138) by an entropic barrier (39, 72) (Figures 6, 7, 9, Column 15, lines 45-50).

19. As to Claim 49, Austin et al. disclose the loading chamber (66) (Figure 6) coupled to a first electrical contact (130) through an entropic barrier (39, 72) (Figures 6, 7, 9).

20. As to Claims 50 and 52, Austin et al. disclose the separation channels (206) (Figure 16) coupled to a second electrical contact (42), where the first and second electrical contacts provide an electric field for driving molecules through the separation channels by a power source (Column 6, lines 7-18).

21. As to Claims 51, 53, and 55, Austin et al. disclose a separating device for separating larger molecules from smaller molecules comprising alternating unconstricted regions (above 76) and entropic barriers (72) (Figure 7) forming a channel (206) (Figure 16), the channel having a depth and length sufficient to allow larger molecules to approach their equilibrium shape (Figures 17A-17E, Column 21, lines 22-30) and means for creating entropic barriers to selected molecules in the channel (Figure 7, Column 14, lines 15-34), the entropic barrier influencing the shape of selected molecules as they move through the channel (Figure 16, Column 21, lines 12-30).

22. As to Claim 54, Austin et al. disclose the entropic barriers providing a differential delay of molecules as they move through the channel based on size (Column 14, lines 26-34).

23. As to Claim 56, Austin et al. disclose a device for separating molecules including constricted regions (54, between 73 and 74) (Figures 4A, 7) and unconstricted regions

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(above 76) that form a channel (206) (Figure 16), where the unconstricted regions are sufficiently large for a larger molecule to attain its equilibrium shape as it moves through the channel (Figures 17A-17E, Column 21, lines 22-30) in response to a driving force (Column 6, lines 7-11) and the constricted regions are sufficiently small to influence amount of time it takes molecules to move through the constricted regions and pass through the channel (Claim 55(c)).

***Claim Rejections - 35 USC § 103***

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

25. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

26. Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Austin et al. in view of Wilding et al.

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27. Austin et al. do not disclose using an optical microscope as a detector, but do disclose using a transparent cover for viewing the molecules (Column 6, lines 1-3).

28. Wilding et al. disclose a separating device comprising means for optical detection through a transparent cover (Column 8, lines 1-7) by using a microscope (Column 9, lines 49-53).

29. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device disclosed by Austin et al. by using a microscope for optical detection as disclosed by Wilding et al. because it useful in detecting different types of molecules more closely and a transparent cover would allow observation by use of a microscope.

### ***Double Patenting***

30. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.



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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

31. Claims 24-41 and 44-56 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6635163. Although the conflicting claims are not identical, they are not patentably distinct from each other because they inherently describe the same separation device of alternating constricted and unconstricted regions where the constricted regions trap smaller molecules allow passage of larger molecules. The main difference between the claims of the present application and the claims of U.S. Patent No. 6635163 is the mention of transforming the shape of the larger molecules in order for them to pass through the constricted regions. However, Claim 9 of U.S. Patent No. 6635163 discloses that the constricted regions have a depth of between 5 nm and 500 nm, which would bring about the deformity of larger molecules in order for them to pass through the constricted region and continue to move along the channel.

32. Claims 42 and 43 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6635163 in view of Wilding et al.

33. U.S. Patent No. 6635163 does not disclose using an optical microscope as a detector.

34. Wilding et al. disclose a separating device comprising means for optical detection through a transparent cover (Column 8, lines 1-7) by using a microscope (Column 9, lines 49-53).

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35. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device disclosed by U.S. Patent No. 6635163 by using a microscope for optical detection as disclosed by Wilding et al. because it is useful in detecting different types of molecules more closely.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allison L. Watts whose telephone number is (571) 272-6640. The examiner can normally be reached on Monday through Friday, 9:00 am to 5:30 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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